

PRELIMINARY DATA SUMMARY

October 1985

U.S. Army Engineer Waterways Experiment Station  
Coastal Engineering Research Center  
Field Research Facility  
Duck, North Carolina

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CERC Field Research Facility  
Duck, North Carolina

This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Field Research Facility Measurement and Analysis Work Unit at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility in Duck, North Carolina. The data were collected and the analyses performed by the FRF staff. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

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## I. INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Fig.1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The FRF consists of a 561-m (1,840 ft) long concrete research pier supported on 0.91 m (3 ft) diameter steel piles. The pier deck is 6.1 m (20 ft) wide, 7.74 m (25.4 ft) above mean sea level (MSL), and extends from behind the dunes to approximately the 7.6 m (25 ft) depth contour. In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Most of the data are daily observations or the results of preliminary data analysis. In many instances, continuous analog records and more extensive analyses will be made available later by the CERC Coastal Engineering Information and Analysis Center (CEIAC).

Table 1 is a list of instruments used, their status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depth at the wave gages and current meters vary and may best be determined from the information contained in Figure 8. Other installation information is contained in Table 1. All times unless otherwise specified are referenced to Eastern Standard Time (EST).

Section II presents the meteorological data; Sections III through VI, oceanographic data; Section VII, nearshore profiles and bathymetry; and Section VIII, if included, documents special events that occurred at the FRF during the month.

Questions and/or comments concerning the data may be directed to Mr. Herman C. Miller at (919) 261-3511.

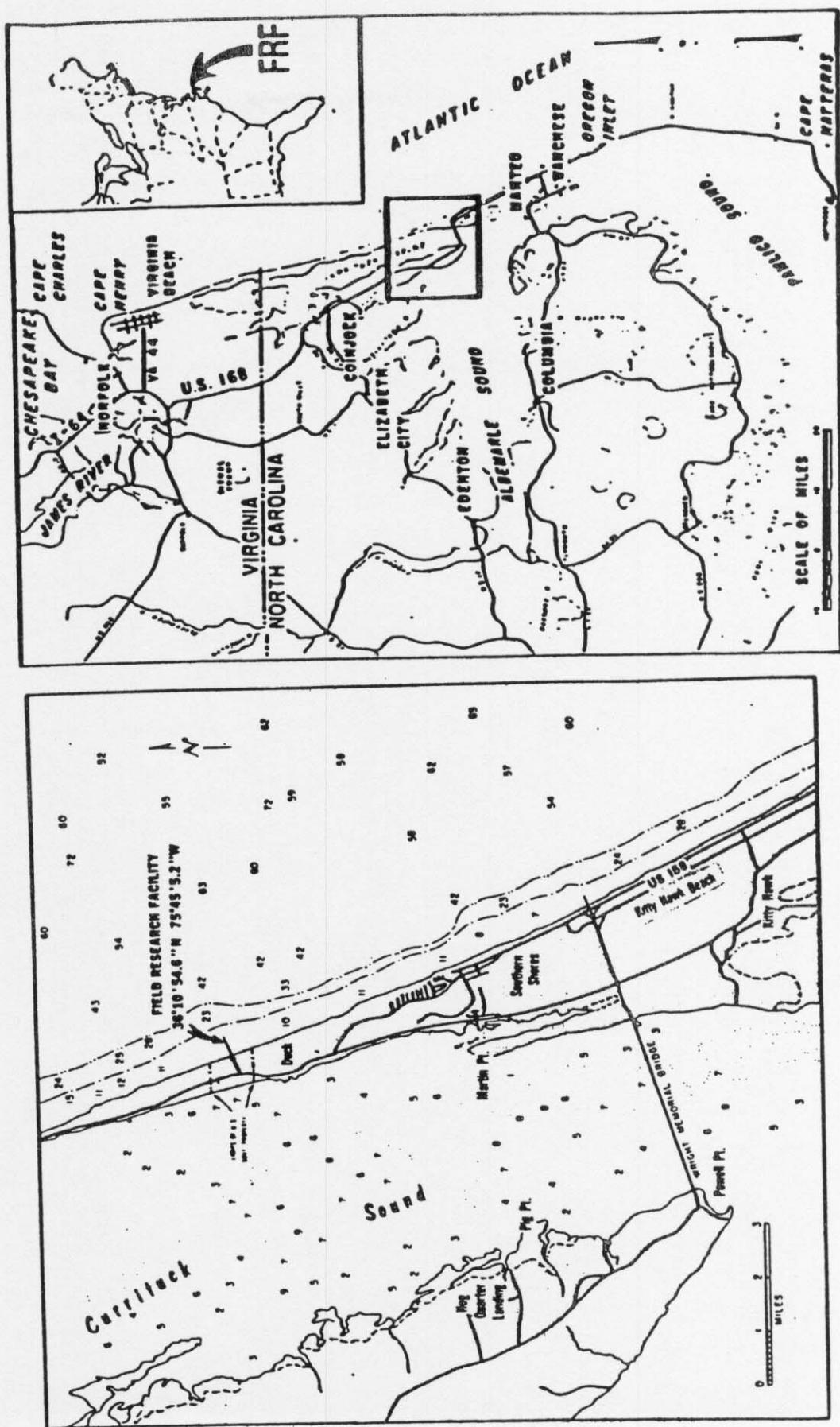


Figure 1. FRF Location Map

TABLE 1  
INSTRUMENT STATUS/DATA AVAILABILITY  
October 1985

GAGE NUMBER	DESCRIPTION/REMARKS	DEPTH AT SENSOR	DAY OF THE MONTH		
			1/2/3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31		
	Barometric Pressure		Data Collected		
			Analog Record		
			Instrument Status		
	Precipitation		Data Collected		
			Analog Record		
	Air Temperature		Instrument Status		
			Data Collected		
			Maximum/Minimum		
			Instrument Status		
	Antennas at Lab Bluff - Elevation 19m (HSL)		Data Collected		
			Analog Record		
	Baylor staff located at station 7480 on FRP pier	See profile data	Instrument Status		
645			Data Collected		
	Baylor staff located at station 19-00 on FRP pier	See profile data	Instrument Status		
			Data Collected		
	Waverider buoy located 1.0 km from shore	APPROX. 8.5 m. MSL	Instrument Status		
646			Data Collected		
	Waverider buoy located 6.0km from shore	APPROX. 18 m. MSL	Instrument Status		
650			Data Collected		
	Current meter at station 14+20 on FRP pier	See profile data	Instrument Status		
659			Data Collected		
	Current meter 500M south (0.5km offshore)	APPROX. 6 m MSL	Instrument Status		
679			Data Collected		
	NOAA primary tide station 865-1370	Instrument Status			
	located at seaward end of FRP pier	Data Collected			

Instrument Status: Operational  - Daily Observation: YES   
 Data Collected: ALL  SOME   
 Analog Record: ALL  PARTIAL   
 Preliminary Analysis: ALL  SOME

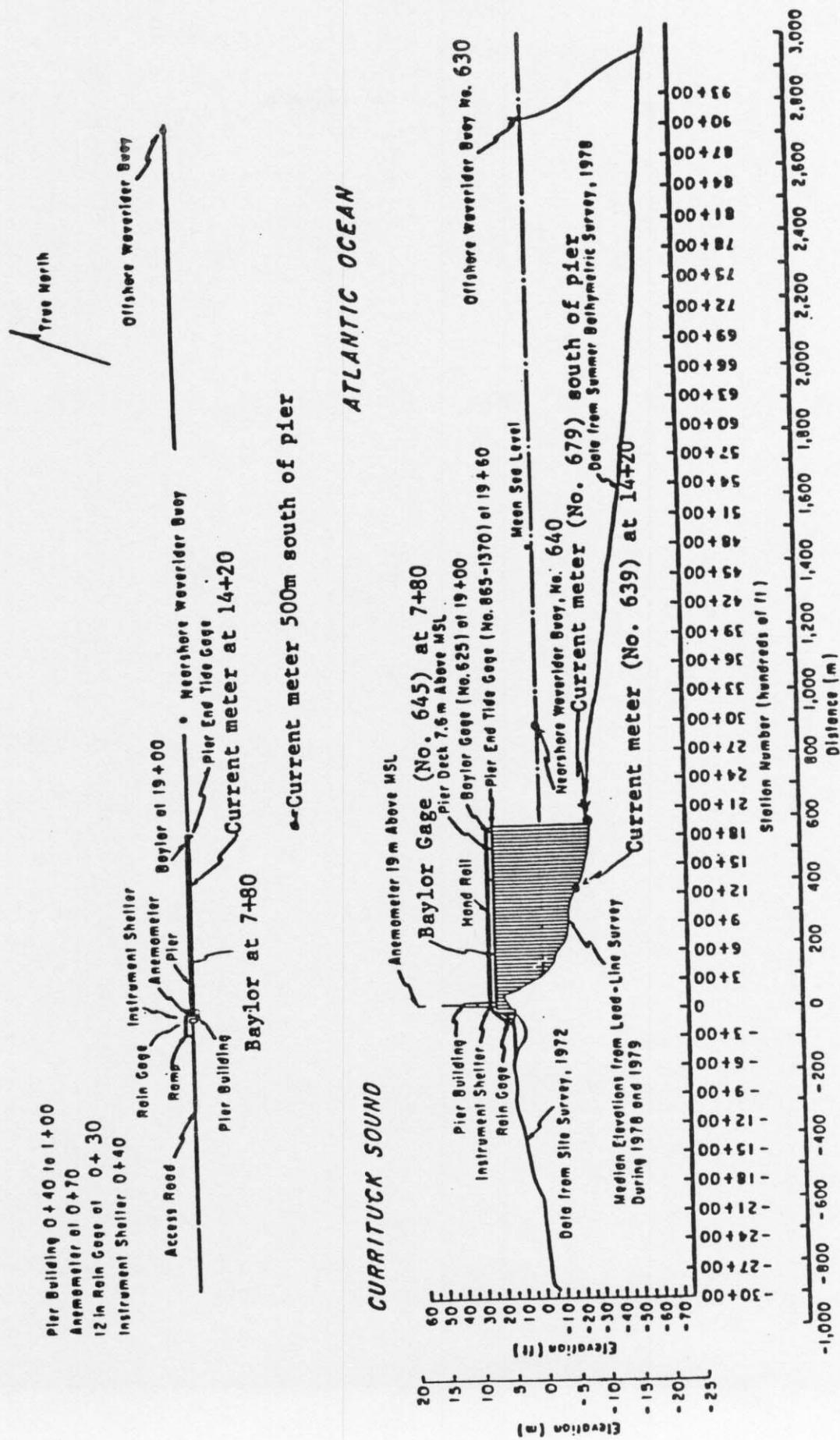


Figure 2. Instrument locations at FRF.

## II. METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Fig. 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored on magnetic tape using a Data General NOVA-4 computer. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

The wind measurements are obtained from a Weather Measure Skyvane located on the FRF laboratory building (Fig. 2), 19.1 m above mean sea level (MSL).

The high and low temperatures are obtained from daily readings of NWS maximum and minimum thermometers and represent the extreme temperature values since the last reading.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in) -  
 $mm \times .03937 = in$
2. Millibars (mb) to inches of mercury (in Hg) -  
 $mb \times 0.02953 = in Hg$
3. Degrees Celcius (C) to degrees Fahrenheit (F) -  
 $(C \times 9/5) + 32 = F$
4. Meters per second (m/s) to knots (kn) -  
 $m/s \times 1.943 = kn$

TABLE 2: METEOROLOGICAL DATA

PART 1

OCTOBER 1985

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
1	100	3	110		1019.7	0
	700	3	75		1018.9	13
	1300	4	112	**	1018.4	0
	1900	6	101		1016.6	0
2	100	3	156		1016.7	0
	700	2	190		1018.2	0
	1300	5	137		1018.1	0
	1900	7	145	22.7	1018.3	0
3	100	2	167	22.1	1018.6	0
	700	2	198	23.3	1018.5	0
	1300	3	136	28.1	1017.5	0
	1900	0		24.5	1017.3	0
4	100	0		22.4	1016.5	0
	700	0		20.5	1017.4	0
	1300	4	207	23.5	1016.0	0
	1900	6	202	22.8	1015.3	0
5	100	6	213	22.9	1010.3	0
	700	7	207	22.8	1006.8	0
	1300	7	236	24.8	1007.8	0
	1900	7	300	21.2	1010.4	0
6	100	8	307	16.6	1013.7	0
	700	6	311	14.1	1015.4	0
	1300	4	5	18.5	1016.3	0
	1900	4	26	16.7	1018.1	0
7	100	4	324	15.1	1020.9	0
	700	5	319	16.1	1022.5	0
	1300	6	36	18.7	1024.9	0
	1900	6	52	17.2	1026.8	0
8	100	7	63	17.3	1029.4	0
	700	10	59	18.8	1025.7	0
	1300	7	91	22.8	1024.9	0
	1900	8	59	20.5	1025.7	0
9	100	6	63	20.9	1024.5	0
	700	7	46	21.0	1024.3	0
	1300	6	38	22.2	1025.5	0
	1900	5	56	20.7	1024.1	0
10	100	3	32	20.7	1022.7	0
	700	1	67	20.8	Computer maintenance	0
	1300	3	198	22.5	1018.3	0
11	100	4	226	21.2	1016.5	0
	700	3	278	20.8	1016.2	0
	1300	9	54	20.1	Computer maintenance	0
	1900	7	53	19.9	1018.3	0
12	100	7	54	18.8	1019.7	0
	700	9	53	18.7	1021.7	0
	1300	6	57	18.8	1022.8	0
	1900	7	57	18.8	1022.2	0
13	100	5	108	20.2	1020.9	0
	700	6	135	21.3	1020.8	0
	1300	5	140	23.9	1019.4	0
	1900	3	178	21.5	1017.4	0
14	100	2	173	19.6	1017.0	0
	700	3	62	21.0	1016.9	0
	1300	4	101	23.1	1016.0	0
	1900	3	67	22.0	1015.3	0
15	100	3	358	21.6	1014.8	0
	700	3	226	20.8	1014.5	0
	1300	6	244	27.6	1012.4	0
	1900	6	205	24.7	1013.3	0
16	100	6	257	21.2	1015.9	13
	700	4	326	20.0	1018.0	0
	1300	6	35	20.4	1020.4	0
	1900	5	45	19.8	1022.7	0

\*=Electronic problems

\*\*=Gage inoperative

TABLE 2: METEOROLOGICAL DATA

PART 2

OCTOBER 1985

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
17	100	6	54	20.3	1024.6	0
	700	9	50	19.8	1028.6	0
	1300	8	43	20.9	1029.3	0
	1900	11	54	19.2	1029.5	0
18	100	11	57	18.9	1029.7	0
	700	8	72	19.7	1030.1	0
	1300	6	84	21.7	1029.4	0
	1900	6	111	20.3	1028.4	0
19	100	4	124	19.0	1027.3	0
	700	2	175	18.6	1026.0	0
	1300	3	234	23.3	1022.9	0
	1900	2	202	20.7	1020.9	0
20	100			Tape drive crash		0
	700	6	352	21.8	1020.9	0
	1300	8	52	20.5	1020.5	0
	1900	12	51	18.8	1020.9	0
21	100	11	51	19.0	1020.5	0
	700	14	73	19.9	1020.9	0
	1300	14	95	18.2	1019.9	0
	1900	14	46	17.7	1019.2	0
22	100	13	60	19.2	1015.8	0
	700	5	40	18.2	1016.8	100
	1300	4	107	20.3	1018.2	0
	1900	4	13	19.8	1019.5	0
23	100	7	40	19.6	1019.9	0
	700	3	12	20.3	1020.9	0
	1300	5	3	21.0	1020.5	0
	1900	4	1	20.0	1021.2	0
24	100	2	33	19.9	1020.9	0
	700	0		20.4	1021.2	0
	1300	0		22.7	1020.9	0
	1900	0		20.5	1019.9	0
25	100	0		18.9	1018.5	0
	700	0		19.2	1018.2	0
	1300	3	308	22.2	1017.2	0
	1900	9	328	20.0	1018.2	0
26	100	9	337	18.4	1019.7	0
	700	8	355	17.2	1021.7	0
	1300	4	353	17.4	1022.5	0
	1900	1	7	15.6	1022.4	0
27	100	3	40	15.9	1021.8	0
	700	2	81	17.0	1022.1	0
	1300	3	96	20.8	1020.6	0
	1900	0		18.8	1019.4	0
28	100	0		17.5	1018.0	0
	700	3	303	18.6	1017.9	0
	1300	*		17.0	1019.4	0
	1900	8	336	14.7	1020.9	0
29	100	12	11	14.6	1020.9	0
	700	10	354	13.6	1021.8	0
	1300	8	355	14.1	1021.3	0
	1900	9	353	13.2	1020.3	0
30	100	9	23	14.6	1018.5	0
	700	8	21	16.2	1017.2	0
	1300	7	32	17.7	1014.9	0
	1900	7	13	17.4	1013.7	3
31	100	9	18	17.5	1011.4	0
	700	9	358	17.9	1009.7	10
	1300	7	353	19.0	1008.9	0
	1900	9	356	18.4	1007.5	4

\*=Electronic problems

\*\*=Gage inoperative

### III. WAVE DATA

Wave data were collected from two Baylor staff gages (CERC gage Nos. 625 and 645) and Waverider buoys (CERC gage Nos. 630 and 640, Table 1 and Figure 2). The data were collected, analyzed, and stored on magnetic tape using a Data General NOVA-4 computer.

The NOVA-4 is programmed to sample the wave gages every 6 hours near 0100, 0700, 1300, and 1900 EST at a sampling rate of four times per second, collecting data in 20- minute records.

Wave height ( $H_{mo}$ ) is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. The wave period is identified from the computation of a variance (energy) spectrum using a Fast Fourier Transform of 4096 data points (1024 sec). The period ( $T_p$ ) is that associated with the maximum energy density in the spectrum. When this analysis is complete, the data are written to magnetic tape and entered into the CERC data base.

Table 3 presents the wave heights and periods for each wave record obtained during the month. The monthly means shown in Table 3 are an average of the values computed for all data records collected. The monthly standard deviations are standard deviations from the monthly mean of values for each record.

Figure 3 is a time history of the  $H_{mo}$  and  $T_p$  values for the Waverider 6 km from shore (630) and the Baylor gage at pier station 19+00 (625).

Differences in wave periods between wave gages (Table 4 and Figure 3) may be due to wave breaking or reformation, or the presence of multiple wave trains containing nearly equal energy.

TABLE 3: WAVE DATA

PART 1

OCTOBER 1985

GAGE	DAY	TIME	645		625		640		630	
			Baylor at 7480 Hmo(m)	T(sec)	Baylor at 19400 Hmo(m)	T(sec)	Nearsho Hmo(m)	Wvrd T(sec)	Farsho Hmo(m)	Wvrd T(sec)
	1	1	.54	6.40	.24	14.22	.25	6.40	.62	5.99
	7		.45	6.40	.48	7.42	.51	12.34	.55	6.40
	13		.40	6.40		*	.46	8.06	.53	7.42
	19		.58	5.63			.59	6.40	.72	6.87
2	1		.54	8.06			.56	8.83	.69	8.06
	7		.55	8.83	.49	8.06	.53	8.06	.68	7.42
	13		.51	8.83	.30	8.83	.73	8.83	.73	7.42
	19		.87	6.87			.84	7.42	.87	7.42
3	1		*			*	.63	8.06	.77	8.06
	7						.71	8.06	.70	7.42
	13		.72	7.42	.34	7.42	.70	7.42	.85	7.42
	19		.73	8.06	.64	7.42	.68	8.06	.78	6.40
4	1		.60	8.06	.62	7.42	.67	6.87	.82	7.42
	7		.64	6.87	.59	6.87	.62	7.42	.73	6.40
	13		.65	6.87	.53	6.87	.61	6.87	.85	7.42
	19		*			*	.64	6.87	.77	8.06
5	1		.47	8.06	.51	7.42	.56	8.06	.86	7.42
	7		.71	5.99	.63	6.87	.62	6.40	.86	6.40
	13		.65	6.40	.61	16.79	.66	16.79	.76	6.87
	19		.54	7.42	.64	12.34	.69	12.34	.76	6.87
6	1		.50	7.42	.65	16.79	.72	16.79	1.17	5.63
	7		.79	5.31	.87	5.02	.94	5.31	1.07	5.99
	13		.72	5.31	.82	5.99	.85	5.99	.86	5.31
	19		.57	7.42	.67	8.06	.72	5.63	.76	7.42
7	1		.56	7.42	.63	7.42	.69	14.22	.76	7.42
	7		.49	7.42	.60	12.34	.69	7.42	.80	8.06
	13		.64	4.13	.80	3.95	.84	3.95	.85	8.83
	19		.70	7.42	.73	8.83	.84	8.83	.94	8.06
8	1		.80	8.83	.84	8.83	.89	8.83	1.24	4.76
	7		.95	4.76	1.16	4.53	1.24	4.76	1.32	5.31
	13		1.06	5.63	1.16	5.63	1.30	5.63	1.31	5.63
	19		1.12	6.87	1.14	6.87	1.26	10.89	1.25	6.40
9	1		1.03	8.83	1.05	6.40	1.19	10.89	1.34	9.75
	7		1.10	6.40	1.12	8.83	1.31	9.75	1.32	8.06
	13		1.03	9.75	1.00	7.42	1.20	9.75	1.53	12.34
	19		1.15	12.34	1.17	12.34	1.30	7.42	1.47	12.34
10	1		1.17	9.75	1.16	10.89	1.42	10.89	1.22	8.83
	7		.96	10.89	.96	7.42	1.11	8.83	.89	8.06
	13				Computer maintenance		.80	8.83	.73	8.83
	19		.80	9.75	.73	9.75	.66	8.06	.77	8.83
11	1		.63	8.06	.59	8.83	.65	8.83		
	7		.60	8.06	.48	8.06				
	13				Computer maintenance		.91	4.13	.97	4.13
	19		.62	8.83	.35	4.13	.99	5.02	1.12	5.02
12	1		.63	5.31	.44	5.02	1.07	5.02	1.13	5.63
	7		.67	5.02	.42	5.31	1.13	4.76	1.23	5.02
	13		.65	4.76	.44	5.63	.94	4.76	.93	5.63
	19		.62	5.31	.39	7.42	.89	8.83	1.01	4.76
13	1		.60	6.87	.39	8.83	.95	7.42	1.02	6.40
	7		.58	6.40	.42	7.42	.72	5.02	.87	6.40
	13		.57	5.99	.30	7.42	.70	5.99	.81	5.99
	19		.38	5.31	.30	8.06	.67	5.63	.77	5.31
14	1		.52	5.63	.31	10.89	.81	10.89	.88	10.89
	7		.48	5.31	.40	10.89	.76	10.89	.86	8.83
	13		.57	5.99	.45	10.89	.84	12.34	.91	10.89
	19		.47	12.34	.44	12.34	.78	12.34	.90	12.34
15	1		.61	5.99	.45	12.34	.91	12.34	.98	5.63
	7		.76	5.99	.66	12.34	.73	12.34	.80	12.34
	13		*		.41	12.34	.67	12.34	.74	10.89
	19		.46	12.34	.35	12.34	.53	12.34	.58	10.89
16	1		.38	6.40	.27	14.22	.49	14.22	.53	12.34
	7		.42	5.63	.31	12.34	.82	4.53	.78	3.95
	13		.59	4.32	.68	10.89	.68	4.76	.75	4.32
	19		.53	4.53						

\*-Electronic problems

TABLE 3: WAVE DATA

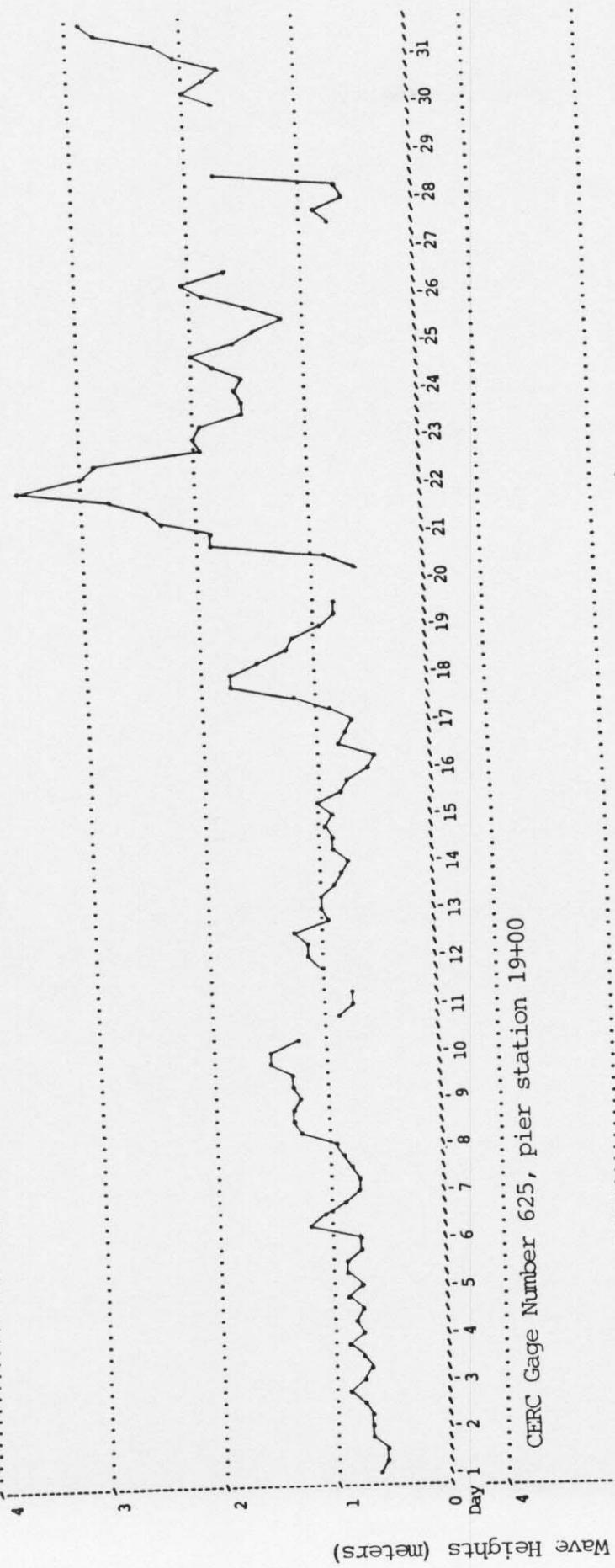
PART 2

OCTOBER 1985

GAGE		645		625		640		630	
DAY	TIME	Baylor at 7480 Hmo(m)	T(sec)	Baylor at 19400 Hmo(m)	T(sec)	Nearshtr Wvrdt Hmo(m)	T(sec)	Farsht Wvrdt Hmo(m)	T(sec)
17	1	.47	5.63	.57	3.95	.61	9.75	.66	4.76
	7	.66	3.64	.84	4.13	.94	4.13	.86	4.13
	13	.81	5.31	.95	5.02	1.06	5.63	1.16	4.76
	19	1.24	5.99	1.44	5.99	1.63	5.31	1.75	5.31
18	1	1.10	6.40	1.40	5.63	1.46	6.87	1.75	5.99
	7	1.14	6.87	1.23	6.87	1.38	6.87	1.48	7.42
	13	1.00	7.42	1.00	7.42	1.05	5.63	1.25	6.40
	19	.92	7.42	.90	7.42	1.11	7.42	.92	6.52
19	1	.80	8.26	.74	8.26	.81	8.26	.80	5.55
	7	.62	7.59	.62	6.30	.68	7.91	.80	7.01
	13	.63	7.29	.32	7.01	.63	7.01	.80	7.01
	19			.32	7.01				
20	1								
	7	.53	7.91	.55	7.91	.63	7.59	.62	7.91
	13	.73	8.64	.77	8.26	.87	3.76	.88	7.59
	19	1.22	6.30	1.50	6.30	1.63	6.10	1.88	6.10
21	1	1.11	7.29	1.52	6.76	1.68	5.39	1.84	6.52
	7	1.47	7.29	1.95	7.59	2.22	6.76	2.34	7.01
	13	1.65	6.76	2.03	7.29	2.36	7.29	2.42	7.01
	19	1.44	7.91	2.53	9.06	3.54	8.64	2.74	7.59
22	1	1.84	9.06	2.75	9.06	3.34	9.06	3.59	9.53
	7	1.63	10.04	2.53	9.06	2.73	10.04	2.89	10.04
	13	*		2.43	9.53			1.96	10.04
	19	1.57	9.53	1.77	10.04	2.05	9.53	2.02	9.53
23	1	1.58	9.06	1.61	9.06	1.83	9.53	1.92	9.53
	7	1.47	9.53	1.53	9.53	1.75	8.64	1.59	7.91
	13	1.28	8.26	1.35	8.64	1.46	8.26	1.57	9.53
	19	1.23	9.53	1.40	8.26	1.54	8.26	1.62	9.06
24	1	1.36	8.64	1.36	8.26	1.57	9.06	1.55	8.64
	7	1.29	8.64	1.42	9.06	1.46	9.53	1.81	8.26
	13	1.47	10.04	1.43	9.53	1.60	9.53		
	19	1.58	10.04	1.73	10.61	1.97	10.04	1.99	9.53
25	1	1.58	10.04	1.48	9.06	1.72	9.53	1.63	7.59
	7	1.33	9.53	1.25	10.61	1.51	10.04	1.43	7.91
	13	1.25	9.75	1.05	9.75	1.32	9.75	1.22	8.83
	19	1.05	8.83	1.25	10.89	1.46	10.89	1.48	9.75
26	1	1.24	5.63	1.63	5.99	1.70	5.63	1.87	5.99
	7	1.33	5.99	1.71	5.99	1.93	5.99	2.06	5.63
	13	1.12	8.83	1.44	6.40	1.56	9.75	1.70	6.87
	19								
27	1								
	7							.78	8.83
	13	.79	8.83	.67	8.06	.68	8.83	.86	8.83
	19	.68	7.42	.65	9.75	.70	8.83	.60	8.83
28	1	.57	8.06	.48	8.06	.58	6.87	.66	8.83
	7	.55	8.83	.53	8.83	.61	8.83	1.56	5.63
	13							1.74	5.63
	19								
29	1								
	7								
	13								
	19								
30	1	1.21	4.53	1.54	5.99	1.69	5.99	1.74	5.63
	7	1.23	5.99	1.58	6.40	1.77	6.40	1.97	6.40
	13	1.21	5.63	1.38	5.99	1.56	5.31	1.83	6.40
	19			1.31	7.42	1.54	6.87	1.66	7.42
31	1	*		1.64	6.87	1.80	7.42	2.06	7.42
	7			1.96	8.83	2.09	7.42	2.22	8.83
	13	1.34	8.83	2.21	9.75	2.34	8.83	2.77	8.83
	19	1.57	9.75	2.52	9.75	2.90	8.83	2.86	9.75
	MEAN	.88	7.43	.98	8.46	1.14	8.16	1.25	7.54
	STD	.37	1.83	.59	2.55	.61	2.58	.62	1.92

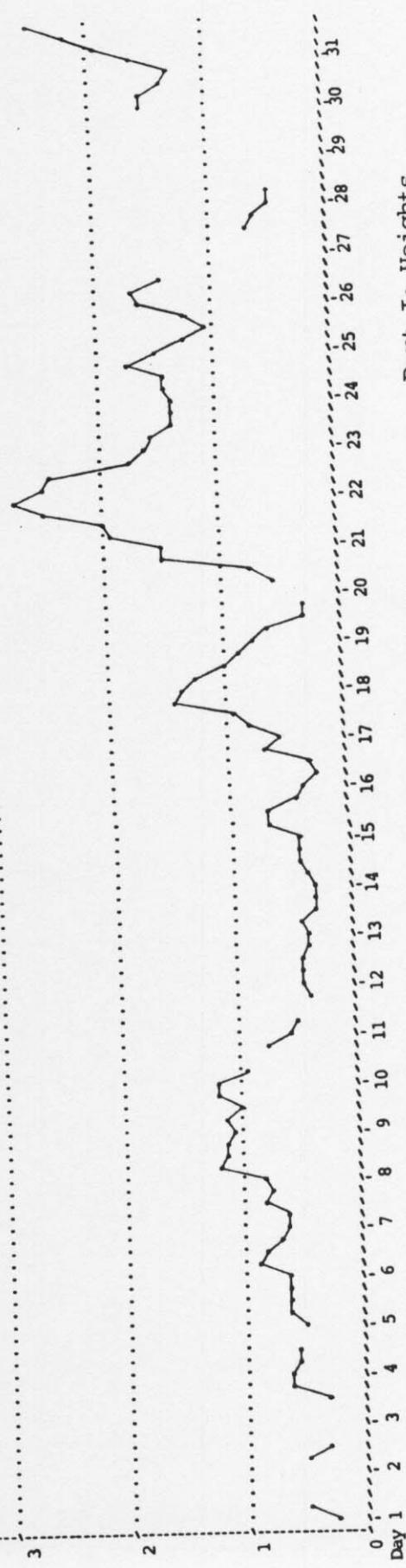
\*=Electronic problems

CERC Gage Number 630, Waverider 6 km from shore



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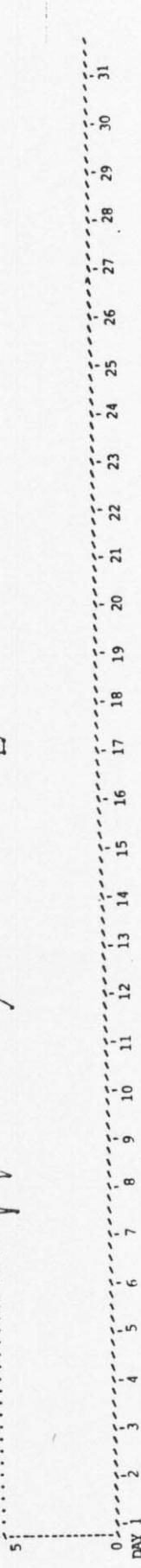
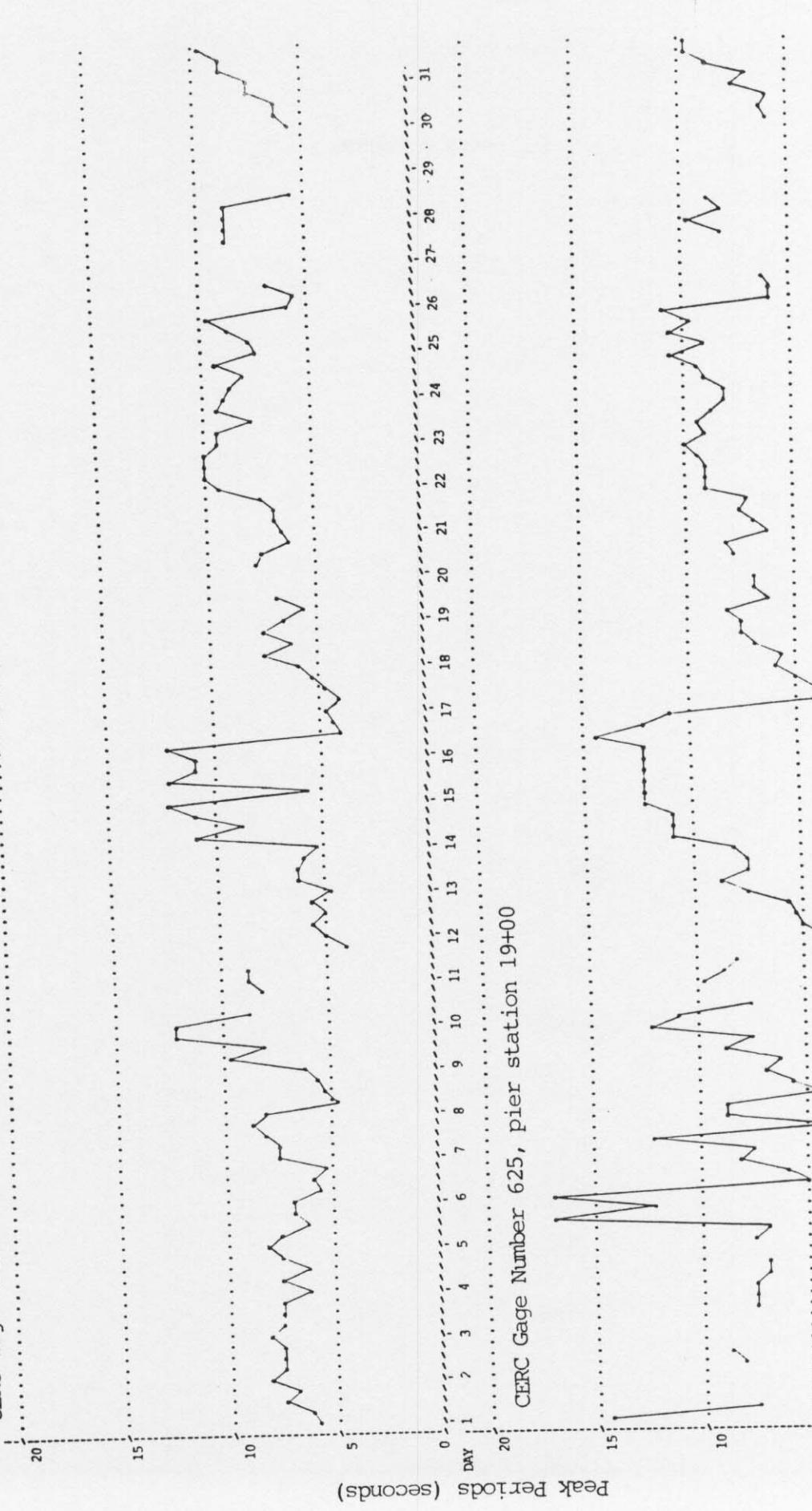
12



Part I: Heights

FIGURE 3. Time History of Wave Heights and Periods - October 1985

CERC Gage Number 630, Waverider 6 km from shore



Part II: Periods

FIGURE 3. Time History of Wave Heights and Periods - October 1985

#### IV. CURRENT DATA

Current data (Table 4) are collected from two Marsh-McBirney electromagnetic biaxial current meters (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20W, alongshore currents flow either toward 340 (i.e. northward) or toward 160 (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second.

TABLE 4: CURRENT DATA  
(SPEEDS IN CM/SEC)

October 1985

## ELEM. MEASUREMENTS

BEACH MEASUREMENTS  
(500' UPDRIFT)

TIME	DYE AT 19400 (579m)	CURRENT METER AT 14120(423m) (SURFACE) (DEPTH -4.2m MSL)	DYE AT MID-SURF ZONE (SURFACE) INST. FROM BASELINE(M)	NYC 12M OFFSHORE (SURFACE)	CURRENT METER AT SOUTH TRIPOLI (DEPTH -4.8m MSL)					
					LOCATION:	SEEDED	DIR.	SEEDED	DIR.	SEEDED
0100-Alongshore										
Cross-shore										
Resultant										
0700-Alongshore	15	N		19	N		10	N	5	S
Cross-shore	4	On		116	1	Off	South	9	DF	
Resultant	15	354		19	337			10	28	
1300-Alongshore										
Cross-shore										
Resultant										
1900-Alongshore										
Cross-shore										
Resultant										
0100-Alongshore										
Cross-shore										
Resultant										
0700-Alongshore	27	N		36	N		9	N	*	
Cross-shore	1	On		116	9	On	South	9		
Resultant	27	343		37	354					
1300-Alongshore										
Cross-shore										
Resultant										
1900-Alongshore										
Cross-shore										
Resultant										
0100-Alongshore										
Cross-shore										
Resultant										
0700-Alongshore	17	S		41	N		11	N		
Cross-shore	8	On		140	2	Off	South	11		
Resultant	19	7		41	337					
1300-Alongshore										
Cross-shore										
Resultant										
1900-Alongshore										
Cross-shore										
Resultant										
0100-Alongshore										
Cross-shore										
Resultant										
0700-Alongshore	32	S		44	N		3	N		
Cross-shore	0	0		142	9	On	South	3		
Resultant	32	160		44	351					
1300-Alongshore										
Cross-shore										
Resultant										
1900-Alongshore										
Cross-shore										
Resultant										
0100-Alongshore										
Cross-shore										
Resultant										
0700-Alongshore	23	N		47	N		38	N	4	S
Cross-shore	112	Off		128	7	Off	South	38	9	DF
Resultant	26	313		47	331			4	96	
1300-Alongshore										
Cross-shore										
Resultant										
1900-Alongshore										
Cross-shore										
Resultant										
0100-Alongshore										
Cross-shore										
Resultant										
0700-Alongshore	51	S		29	S		33	S	5	S
Cross-shore	0	0		140	4	Off	North	33	8	DF
Resultant	51	160		29	169			9	101	
1300-Alongshore										
Cross-shore										
Resultant										
1900-Alongshore										
Cross-shore										
Resultant										

KEY = ALL SPEEDS IN CM/SEC  
 N = NORTHWARD, SHORE PARALLEL  
 S = SOUTHWARD, SHORE PARALLEL  
 ON = ONE SHORE  
 OF = OFFSHORE

KEY	TIME	F128 MEASUREMENTS			BEACH MEASUREMENTS (500' UPKIFT)			CURRENT METER AT SOUTH TRIFID
		DYE AT	CURRENT METER	DYE AT MID-CUFF ZONE (SURFACE)	DYE	DIST. FROM	(DEPTH - 4.8m MSL)	
7	0100-Alongshore	19400	AT 14120(432m) (579m)	I.D. #639 (SURFACE)(DEPTH - 4.2m MSL)	12M OFFSHORE (SURFACE)			
7	0700-Alongshore	129	S	150	41 N	14 S	1.0.6679	
	Cross-shore	16	On	41	0 0			
	Resultant	129	149		340			
7	1300-Alongshore							
	Cross-shore							
	Resultant							
7	1900-Alongshore							
	Cross-shore							
	Resultant							
8	0100-Alongshore							
	Cross-shore							
	Resultant							
8	0700-Alongshore	0	0	164	18 N	5 N		
	Cross-shore	8	On	20	On			
	Resultant	8	250	27	28			
8	1300-Alongshore							
	Cross-shore							
	Resultant							
8	1900-Alongshore							
	Cross-shore							
	Resultant							
9	0100-Alongshore							
	Cross-shore							
	Resultant							
9	0700-Alongshore	32	S	156	55 N	38 N		
	Cross-shore	6	Off	36	On			
	Resultant	33	171	66	13			
9	1300-Alongshore							*
	Cross-shore							
	Resultant							
9	1900-Alongshore							
	Cross-shore							
	Resultant							
10	0100-Alongshore							
	Cross-shore							
	Resultant							
10	0700-Alongshore	17	S	165	68 N	52 N		
	Cross-shore	5	On	10	On			
	Resultant	18	143	68	349			
10	1300-Alongshore							
	Cross-shore							
	Resultant							
10	1900-Alongshore							*
	Cross-shore							
	Resultant							
11	0100-Alongshore							
	Cross-shore							
	Resultant							
11	0700-Alongshore	7	N	150	41 N	26 N		
	Cross-shore	3	Off	36	On			
	Resultant	7	318	55	22			
11	1300-Alongshore							
	Cross-shore							
	Resultant							
11	1900-Alongshore							
	Cross-shore							
	Resultant							
12	0100-Alongshore							
	Cross-shore							
	Resultant							
12	0700-Alongshore	41	S	140	51 S	28 S		
	Cross-shore	14	On	8	On			
	Resultant	43	143	51	153			
12	1300-Alongshore							
	Cross-shore							
	Resultant							
12	1900-Alongshore							
	Cross-shore							
	Resultant							
GAGE INOPERATIVE								

KEY = ALL SPEEDS IN CM/SEC  
 N = NORTHWARD, SHORE PARALLEL  
 S = SOUTHWARD, SHORE PARALLEL  
 ON = ONE SHORE  
 OF = OFFSHORE

DAY	TIME	TIDE MEASUREMENTS			BEACH MEASUREMENTS (500' UPDRIFT)			CURRENT METER		
		DYE AT	CURRENT METER	DYE AT MIN-SURF ZONE	DYE	AT SOUTH TRIFOD				
		19400 (579m)	AT 14120(433m) 1.D.0639 (SURFACE) (SURFACE)(DEPTH -4.2m MSL)	(SURFACE)	12M OFFSHORE (SURFACE)	(DEPTH -4.8m MSL)				
					DIST. FROM					
		SPEED	DIR	BASELINE(M)	SPEED	DIR	LOCATION	SPEED	DIR	SPEED
12	0100-Alongshore							0		
	Cross-shore							1	DN	
	Resultant							1	250	
13	0700-Alongshore	27 N			32 N		21 N	7 N		
	Cross-shore	0 0		128	0 0		South	7	335	
	Resultant	27 340			32 340			12	N	
13	1300-Alongshore							4	ON	
	Cross-shore							13	323	
	Resultant							5	N	
13	1900-Alongshore							3	ON	
	Cross-shore							6	305	
	Resultant							9	N	
14	0100-Alongshore							3	ON	
	Cross-shore							9	320	
	Resultant							8	N	
14	0700-Alongshore	29 N			18 N		41 N	1 OF		
	Cross-shore	9 On		140	0 0		South	8	347	
	Resultant	30 357			18 340			13	N	
14	1300-Alongshore							0		
	Cross-shore							13	340	
	Resultant							8	N	
14	1900-Alongshore							4	ON	
	Cross-shore							9	315	
	Resultant							2	N	
15	0100-Alongshore							1	OF	
	Cross-shore							2	353	
	Resultant							9	N	
15	0700-Alongshore	28 N			27 N		25 N	1 ON		
	Cross-shore	8 Off		131	12 On		South	9	333	
	Resultant	29 323			29 4			7	N	
15	1300-Alongshore							4	ON	
	Cross-shore							8	313	
	Resultant							7	N	
15	1900-Alongshore							0		
	Cross-shore							7	340	
	Resultant							1	S	
16	0100-Alongshore							3	ON	
	Cross-shore							3	234	
	Resultant							14	N	
16	0700-Alongshore	0 0			14 S		29 S	1 OF		
	Cross-shore	5 On		116	4 On		North	14	345	
	Resultant	5 250			14 143			7	S	
16	1300-Alongshore							4	OF	
	Cross-shore							8	132	
	Resultant							12	N	
16	1900-Alongshore							2	OF	
	Cross-shore							12	350	
	Resultant							2	N	
17	0100-Alongshore							1	OF	
	Cross-shore							2	1	
	Resultant							5	N	
17	0700-Alongshore	0 0			41 S		46 S	1 ON		
	Cross-shore	9 On		130	12 On		North	5	332	
	Resultant	9 250			42 143			15	S	
17	1300-Alongshore							4	OF	
	Cross-shore							16	142	
	Resultant							14	S	
17	1900-Alongshore							4	OF	
	Cross-shore							14	146	
	Resultant							15	S	
18	0100-Alongshore							6	OF	
	Cross-shore							16	138	
	Resultant							16	S	
18	0700-Alongshore	9 N			87 N		18 N	4 S		
	Cross-shore	20 On		140	9 On		South	8	OF	
	Resultant	21 94			88 345			9	94	
18	1300-Alongshore							5	S	
	Cross-shore							6	OF	
	Resultant							8	107	
18	1900-Alongshore							3	S	
	Cross-shore							2	OF	
	Resultant							4	126	

KEY = ALL SPEEDS IN CM/SEC  
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S = SOUTHWARD, SHORE PARALLEL  
ON=ON SHORE  
OF=OFFSHORE

TIME	DYE MEASUREMENTS			BEACH MEASUREMENTS (500' UPWIND)			CURRENT METER AT SOUTH TRIFID
	DYE AT 1900 (579m)	CURRENT METER AT 14120 (433m) 1.1.0639	DYE AT MIN-SURF ZONE (SURFACE)	INC	12M OFFSHORE (SURFACE)	(DEPTH -4.8m MSL)	
0100-Alongshore							
Cross-shore							
Resultant							
0700-Alongshore	23 N			61 N			
Cross-shore	1 On			61 On			
Resultant	23 343			86 25			
1300-Alongshore							
Cross-shore							
Resultant							
1900-Alongshore							
Cross-shore							
Resultant							
0100-Alongshore							
Cross-shore							
Resultant							
0700-Alongshore	15 N			55 N			
Cross-shore	4 Off			0 0			
Resultant	15 326			55 340			
1300-Alongshore							*
Cross-shore							
Resultant							
1900-Alongshore							
Cross-shore							
Resultant							
0100-Alongshore							
Cross-shore							
Resultant							
0700-Alongshore	0 0			61 S			
Cross-shore	8 On			27 On			
Resultant	8 250			69 136			
1300-Alongshore							
Cross-shore							
Resultant							
1900-Alongshore							
Cross-shore							
Resultant							
0100-Alongshore							
Cross-shore							
Resultant							
0700-Alongshore	41 N			122 N			
Cross-shore	10 On			121 On			
Resultant	42 354			173 25			
1300-Alongshore							
Cross-shore							
Resultant							
1900-Alongshore							
Cross-shore							
Resultant							
0100-Alongshore							
Cross-shore							
Resultant							
0700-Alongshore	13 S			61 N			
Cross-shore	0 0			152 On			
Resultant	13 360			164 48			
1300-Alongshore							
Cross-shore							
Resultant							
1900-Alongshore							
Cross-shore							
Resultant							
0100-Alongshore							
Cross-shore							
Resultant							
0700-Alongshore	0 0			44 N			
Cross-shore	0 0			30 On			
Resultant	0 0			53 15			
1300-Alongshore							
Cross-shore							
Resultant							
1900-Alongshore							
Cross-shore							
Resultant							
GAGE INOPERATIVE							

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 ON=ON SHORE  
 OF=OFFSHORE

TIME	DYE AT 19400 (579m)	CURRENT METER AT 14420' (433m) (1.1.0.639 (SURFACE))	FEEDE MEASUREMENTS			BEACH MEASUREMENTS (500' DEPTH)			CURRENT METER AT SOUTH TIDEPOD (DEPTH -4.8m MSL) (SURFACE) 1.1.0.675 (DEPTH -4.8m MSL) (SURFACE)
			DYE AT MID SURF ZONE (SURFACE)	DIST. FROM BASELINE (M)	LOCATION	SEEDED	SEEDED	SEEDED	
0100-Alongshore									
Cross-shore									
Resultant									
0700-Alongshore	0 0			23	N				
Cross-shore	4 Off		188	30	On				
Resultant	4 70		38	32					
1300-Alongshore									
Cross-shore									
Resultant									
1900-Alongshore									
Cross-shore									
Resultant									
0100-Alongshore									
Cross-shore									
Resultant									
0700-Alongshore	28 S			87	S				
Cross-shore	8 On		152	87	On				
Resultant	29 143			123	115				
1300-Alongshore									
Cross-shore									
Resultant									
1900-Alongshore									
Cross-shore									
Resultant									
0100-Alongshore									
Cross-shore									
Resultant									
0700-Alongshore	6 N			0 0					
Cross-shore	1 Off		138	1	On				
Resultant	7 331			1	250				
1300-Alongshore									
Cross-shore									
Resultant									
1900-Alongshore									
Cross-shore									
Resultant									
0100-Alongshore									
Cross-shore									
Resultant									
0700-Alongshore	39 S			12	N				
Cross-shore	12 On		122	0	0				
Resultant	36 141			12	390				
1300-Alongshore									
Cross-shore									
Resultant									
1900-Alongshore									
Cross-shore									
Resultant									
0100-Alongshore									
Cross-shore									
Resultant									
0700-Alongshore	32 S			122	S				
Cross-shore	10 On		131	18	On				
Resultant	33 143			123	151				
1300-Alongshore									
Cross-shore									
Resultant									
1900-Alongshore									
Cross-shore									
Resultant									
0100-Alongshore									
Cross-shore									
Resultant									
0700-Alongshore	0 0			66	S				
Cross-shore	12 On		154	17	On				
Resultant	12 255			70	186				
1300-Alongshore									
Cross-shore									
Resultant									
1900-Alongshore									
Cross-shore									
Resultant									
0100-Alongshore									
Cross-shore									
Resultant									
0700-Alongshore	6 0			102	N				
Cross-shore	7 On		164	41	On				
Resultant	7 255			109	18				
1300-Alongshore									
Cross-shore									
Resultant									
1900-Alongshore									
Cross-shore									
Resultant									
			GAGE INOPERATIVE						

KEY = ALL SPEEDS IN CM/SEC  
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 S = SOUTHWIND, SHORE PARALLEL  
 ON-SHORE  
 OFF-SHORE

\*=Gage inoperative

## V. SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) taken at the seaward end of the pier are made of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves) but not surface chop or capillary waves. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring alignment of the wave crests. The pier axis (considered perpendicular to the beach at the FRF) is orientated 70° east of true north; consequently, wave angles greater than 70° imply the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are made daily at the seaward end of the FRF pier. A jar along with a thermometer is lowered about .3 m (1 ft) into the water and allowed to remain for at least one minute. The jar is removed, the temperature read and a hydrometer is used to determine the density. A secci disc is used to determine the surface visibility.

SUPPLEMENTAL OBSERVATIONS

October 1985

DAY	TIME	WAVE APPROACH ANGLE AT PIER END (° from True N)		RADAR WAVE ANGLE (° from True N)	WIDTH OF SURF ZONE (M)	WATER CHARACTERISTICS AT PIER END		
		PRIMARY	SECONDARY			TEMP (°C)	DENSITY (g/cc)	SECCI VIS (M)
1	0635	95		70	10	22.7	1.0204	3.0
2	0634	120	40	80	12	22.8	1.0204	2.4
3	0711	95		70	71	23.0	1.0209	2.1
4	0714	120		80	66	23.5	1.0210	2.4
5	0705	95			49	23.5	1.0205	
6	0750	90	30	70	55	22.3	1.0200	4.3
7	0711			70	75	21.7	1.0212	4.1
8	0712	80		70	109	21.3	1.0209	3.6
9	0729	90	30	75	125	21.2	1.0207	2.4
10	0710	95		90	111	21.3	1.0200	3.0
11	0710	110		80	78	21.8	1.0208	4.1
12	0735	50			67	21.8	1.0206	3.
13	0725	50			52	21.6	1.0216	3.
14	0735	120			67	21.9	1.0216	4.
15	0725	110	70	70	66	22.3	1.0211	5.
16	0715	10		70	7	22.3	1.0221	4.
17	0725	50		70	61	21.9	1.0215	4.
18	0820	80			73	21.8	1.0216	2.
19	0750	70			58	21.6	1.0216	2.
20	0650	80			58	21.8	1.0224	2.
21	0710	65			385	21.1	1.0223	1
22	0720	85		90	562	21.0	1.0220	
23	0650	90	20	80	230	21.2	1.0220	
24	0715	80		80	188	21.1	1.0210	2
25	0645	90		80	179	21.3	1.0211	2
26	0745	60			103	20.6	1.0208	2
27	0745	95			67	19.5	1.0208	2
28	0650	10			21	20.5	1.0218	2
29	0655	50		60	65	18.5	1.0220	
30	0655	70	45		84	17.7	1.0214	1
31	0935	100	20	95	123	17.9	1.0207	1

## VI. WATER LEVELS

The National Ocean Services (NOS) has established a primary tide station (No. 865- 1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect data every 6 minutes throughout the month.

Figure 4 shows the range of each cycle while Figure 5 shows the variation in mean water levels computed over a tidal cycle period (12.42 hours), and contains a list of selected mean and extreme values. This presentation is useful in identifying effects on both meteorological and astronomical forces on the open coast water levels.

Table 6 contains the time of the center of each sampling interval and the range, high, low, and mean water levels during each tidal cycle.

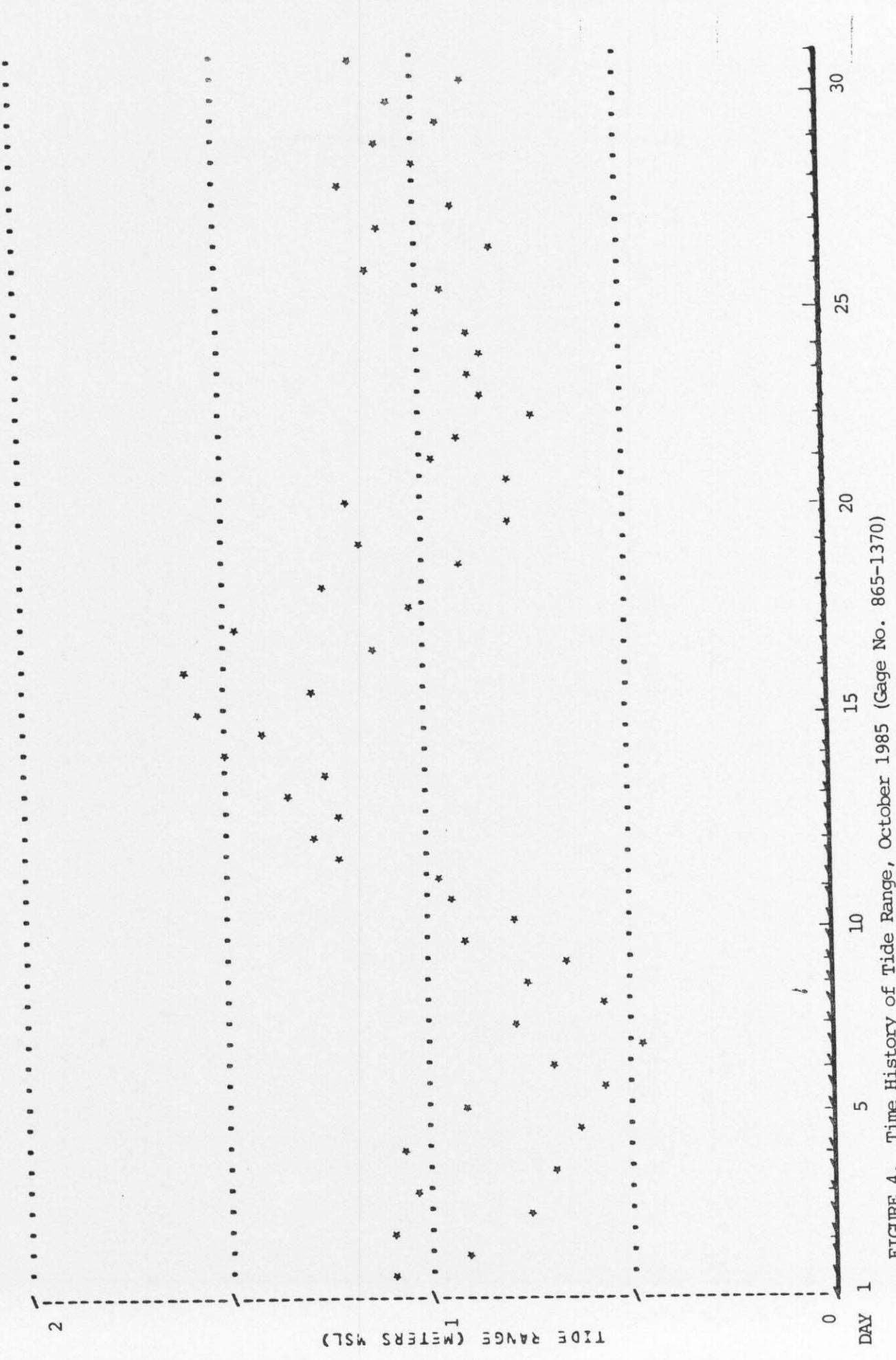


FIGURE 4. Time History of Tide Range, October 1985 (Gage No. 865-1370)

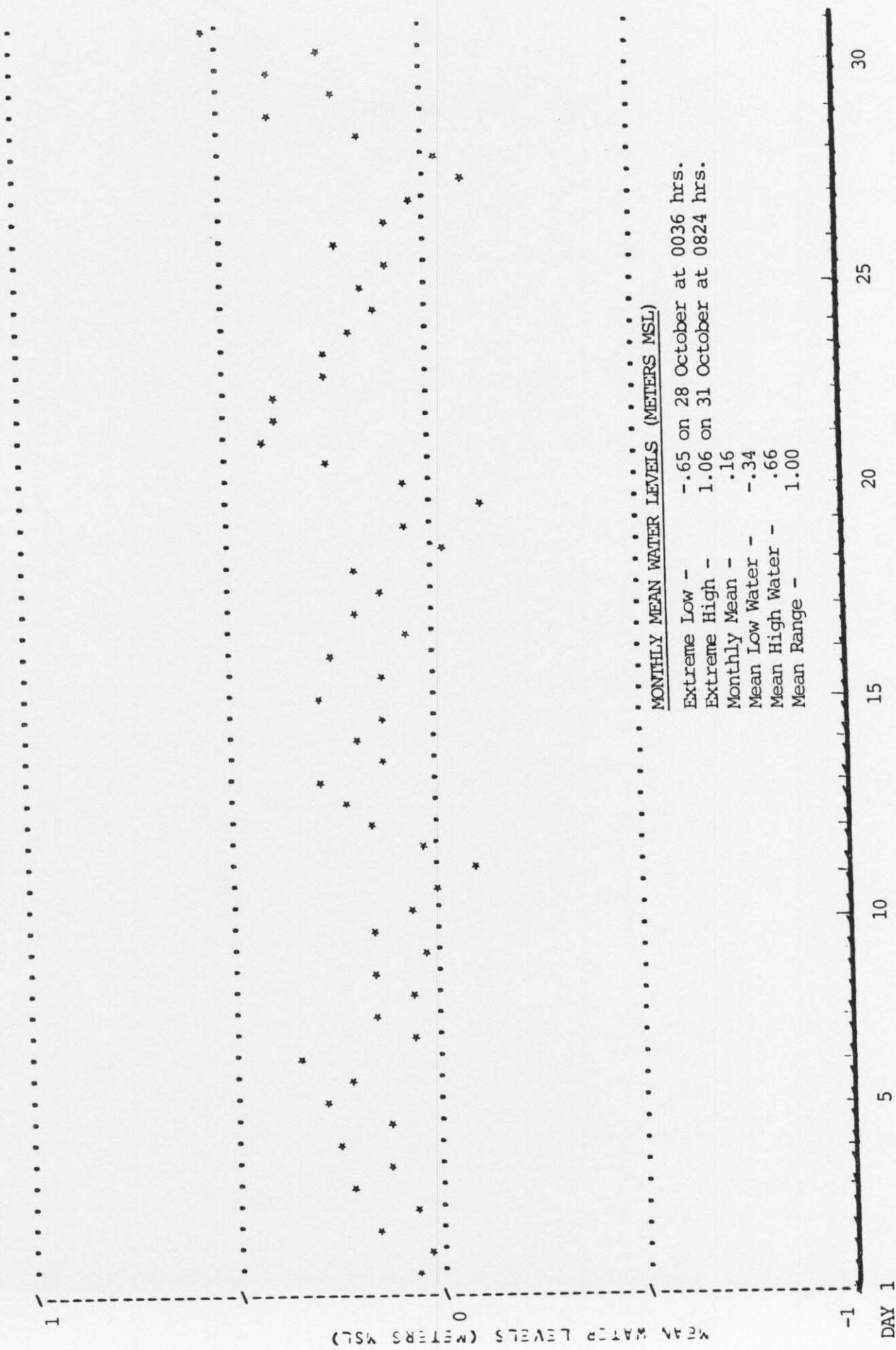


FIGURE 5. Time History of Mean Water Levels, October 1985 (Gage No. 865-1370)

TABLE 6  
WATER LEVELS (METERS MSL)  
October 1985

MID-CYCLE DAY	TIME	LOW	HIGH	MEAN	RANGE
1	612	-.49	.60	.06	1.10
1	1837	-.41	.50	.04	.91
2	702	-.33	.70	.16	1.08
2	1928	-.29	.47	.06	.75
3	753	-.32	.72	.21	1.04
3	2018	-.17	.51	.13	.68
4	843	-.26	.80	.25	1.05
4	2108	-.17	.45	.12	.62
5	934	-.15	.76	.27	.91
5	2159	-.06	.51	.21	.58
6	1024	-.01	.69	.34	.69
6	2249	-.14	.31	.07	.45
7	1114	-.23	.54	.17	.77
7	2340	-.19	.37	.07	.56
8	1205	-.24	.50	.15	.74
9	30	-.28	.39	.04	.67
9	1255	-.31	.59	.17	.90
10	120	-.31	.46	.05	.77
10	1346	-.45	.49	.01	.94
11	211	-.56	.40	-.09	.95
11	1436	-.57	.65	.05	1.22
12	301	-.49	.80	.16	1.29
12	1526	-.37	.84	.23	1.21
13	352	-.40	.95	.28	1.35
13	1617	-.49	.77	.14	1.26
14	442	-.58	.93	.19	1.51
14	1707	-.56	.84	.12	1.40
15	532	-.53	1.05	.27	1.58
15	1758	-.49	.79	.13	1.25
16	623	-.54	1.04	.26	1.58
16	1849	-.50	.62	.06	1.12
17	713	-.55	.92	.20	1.47
17	1938	-.37	.66	.14	1.03
18	804	-.42	.81	.19	1.23
18	2029	-.49	.42	-.04	.91
19	854	-.51	.64	.05	1.15
19	2119	-.52	.26	-.13	.78
20	944	-.54	.65	.07	1.19
20	2210	-.15	.64	.25	.79
21	1035	-.07	.90	.41	.95
21	2300	-.09	.81	.38	.90
22	1125	-.02	.70	.37	.72
22	2350	-.18	.65	.27	.85
23	1216	-.20	.63	.24	.88
24	41	-.26	.58	.18	.84
24	1306	-.31	.55	.14	.89
25	131	-.33	.66	.17	.99
25	1356	-.37	.56	.11	.93
26	222	-.34	.80	.22	1.13
26	1447	-.31	.50	.12	.81
27	312	-.51	.57	.03	1.08
27	1537	-.55	.34	-.10	.89
28	402	-.65	.55	-.03	1.20
28	1628	-.36	.65	.15	1.01
29	453	-.19	.91	.37	1.10
29	1718	-.23	.65	.20	.94
30	543	-.16	.90	.37	1.06
30	1808	-.10	.67	.24	.86
31	634	-.09	1.00	.52	1.15

## VII. NEARSHORE PROFILES

A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Zeiss surveying system; a Zeiss Elta-2 first-order, self-recording electronic theodolite distance meter in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 6 shows the last survey in September and the two surveys taken during October on profile line 188, located 517 m south of the pier. The October surveys show some fluctuation in the size of the nearshore bar (120 to 260 m) with the bar first eroding and then accreting by up to one meter. Only minor changes are visible on the remainder of the profile.

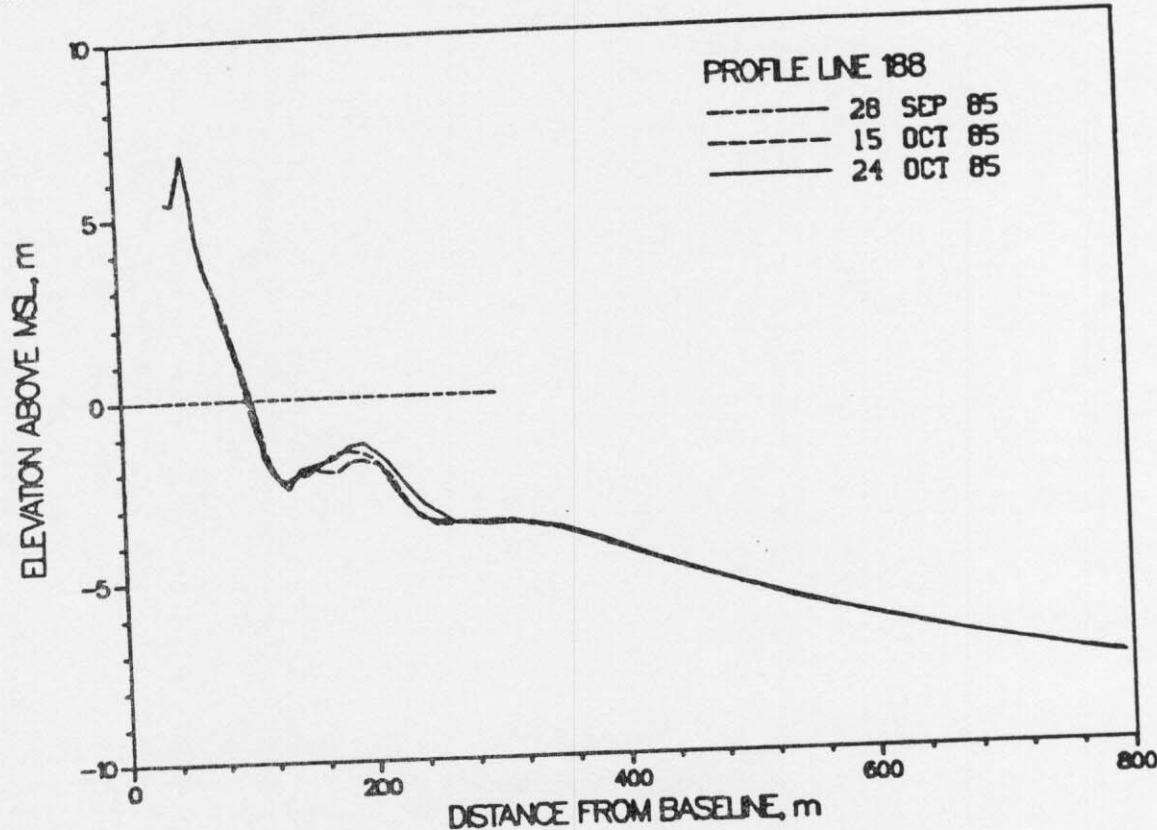


Figure 6. Monthly CRAB profiles on profile 188 - 517 meters south of pier.

The profile envelope (Figure 7) reflects the maximum changes which occurred on the profile between January and October. The minor change visible on the foreshore at MSL (100 m) developed during the 15 October survey.

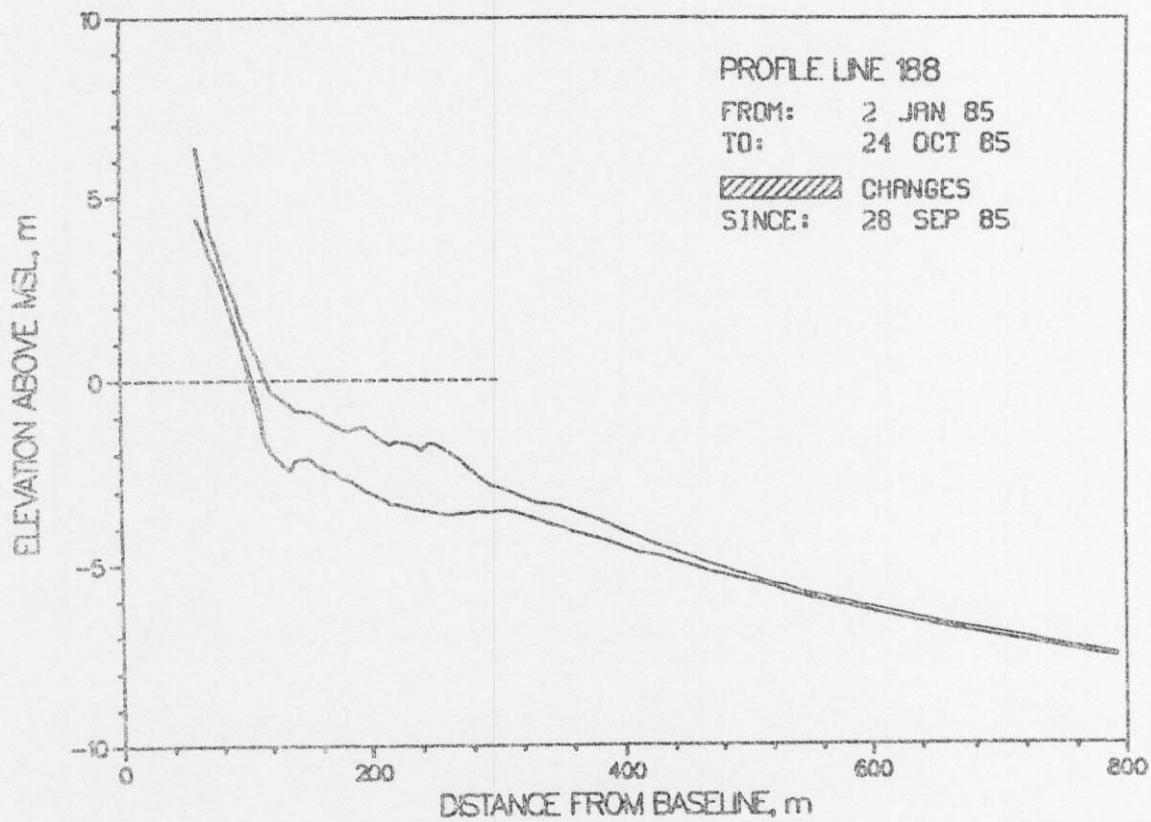


Figure 7. CRAB profile envelope - profile 188.

B. Bathymetry. No bathymetric survey was conducted this month; Figure 8 for 28 September 1985 is included for reference.

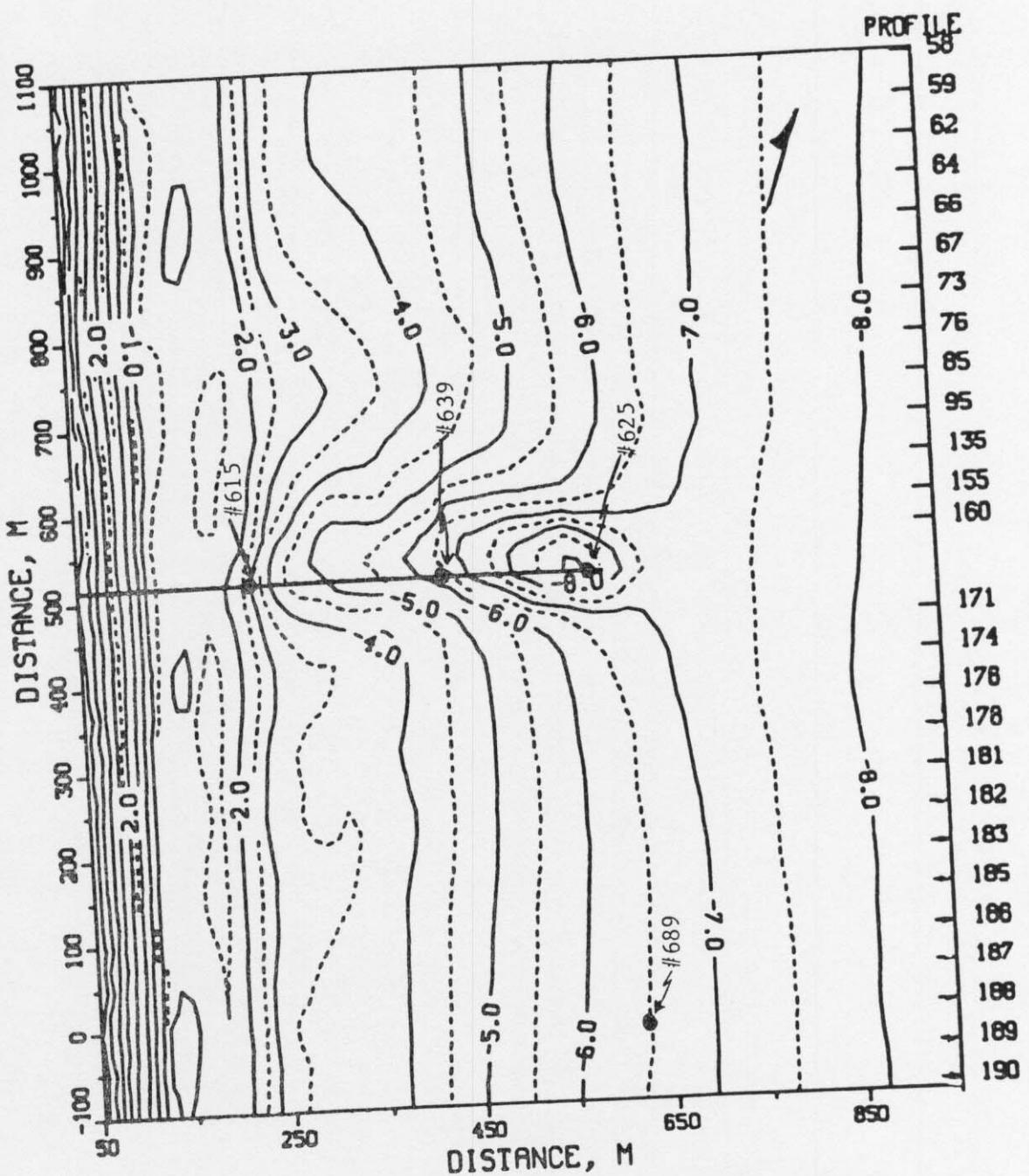


FIGURE 8. FRF BATHYMETRY 28 SEP 85  
CONTOURS IN METERS

## VIII. SPECIAL EVENTS

A. Storm Data Collection. The following list identifies times when the wave height at the seaward end of the pier (i.e. as measured by the Baylor gage #625 at pier station 19+00) exceeded 2 m and wave records were obtained every hour:

<u>Start</u>	<u>End</u>
29 Oct (0200)	29 Oct (0700)
31 Oct (0800)	31 Oct (2400)

## Distribution List

### Government Agencies:

OCE  
BERH  
NAO  
NASA/Wallops Flight Center  
NOAA (NOS, NWS)  
SAD  
SAW

U.S. Geological Survey  
U.S. National Park Service  
U.S. Naval Academy  
U.S. Naval Civil Eng. Lab  
U.S. Naval Facilities Eng. Com.  
U.S. Naval Research Lab

### Colleges/Universities:

California Inst. of Tech.  
Duke University  
East Carolina University  
Florida Inst. of Tech.  
NC State University  
Old Dominion University  
Oregon State University  
Prince George's College  
Rutgers University  
Scripps Inst. of Oceanography

Stockton State College  
Texas A&M University  
University of Akron  
University of Delaware  
University of Florida  
University of Maryland  
University of North Carolina  
University of Northern Colorado  
University of Rhode Island  
University of Virginia  
Virginia Inst. of Marine Science

### Others:

City of Va. Beach, VA  
Coastal Barge Corporation  
Coastal and Est. Res., Inc.  
Coastal Science & Eng., Inc.  
Dr. Galvin  
GEOMET, Inc.  
Greenhorne & O'Mara, Inc.  
Dr. Hylton  
Ms. Johnson  
Mary Marr, Inc.  
Masonite Corporation

Moffatt & Nichol, Eng.  
Offshore Coastal Technologies  
Mr. Rowland  
Mr. Savage  
Sea Port Supply Corp.  
Shell Development  
Sohio Petroleum Co.  
Mr. & Mrs. Valpey  
WCTI-TV

### Foreign:

W. F. Baird & Asso. Coastal Engineers, Ltd (Canada)  
Ministry of Construction, Coastal Division (Japan)  
Norwegian Hydrodynamic Laboratories (Norway)  
University of New South Wales (Australia)  
University of Sydney (Australia)